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DELIRIUM TREMENS:

ITS NATURE AND TREATMENT.

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IN the year 1827, being then a student and a candidate for the degree of Doctor of Medicine, I wrote a dissertation upon Delirium Tremens, and presented it to the Faculty of the College of Physicians and Surgeons of the University of the State of New York, for examination. This dissertation was published by Professor John B. Beck, in the New York Medical and Physical Journal, of which he was at that time the Editor. I ventured at that early period to call the disease the "Irritative Fever of Drunkenness," and endeavored to show that it was a disease of irritation analogous to, if not identical with, irritation induced by causes altogether different from the recognized cause of Delirium Tremens. Thirty years more of observation have not changed my views of the nature of this disease; on the contrary, I have the satisfaction of finding that a number of writers, of far greater note than myself, have, in the course of that time, taken views closely similar to, if not identical with my own. But the methods of treatment I then advocated, *have* been modified by time—perhaps I should rather say, have been *determined* or *defined*—that what was then vaguely suggested, I hope now to communicate in a clearer manner, so that if my opinions be of any value, they may be susceptible of a more ready practical application. My remarks, as originally published in 1827, are as follows:

INAUGURAL DISSERTATION.

When persons who have long indulged in the excessive use of ardent spirits, are suddenly deprived of their accustomed stimulus, they frequently become the subjects of a peculiar and interesting disease. To this affection, the various appellations of "*Delirium Tremens*," "*Mania a Potu*," "*Mania e Temulentia*," and the "*Brain Fever of Drunkenness*," have been given by the different authors who have noticed it.

It is but a short period since the attention of physicians has been in any degree particularly directed to this complaint. In the text books of the student it is not even mentioned; and most that is to be learnt concerning it, must be searched for through our periodical works. Dr. Armstrong, in his excellent work on Typhus, has given a concise and correct history of the disorder, together with its symptoms and mode of treatment. He thinks that Hippocrates has described it in his *Epidemics*, particularly in the case of Chæriion, in the third book. It appears, however, that among the moderns, Dr. Samuel Burton Pearson published the first account of it. In 1812, a short paper on the subject, by Dr. Armstrong, and in the year following the "*Tracts*" of Dr. Sutton were published. Since that time, a number of papers, and cases of the disease have appeared in different periodical journals, and more particularly in the United States. The most prominent of these are the communications of Dr. Klapp, published in the seventh volume of the *Eclectic Repertory*, and in the first volume of the *Medical Recorder*; the cases of Dr. Channing, in the eighth volume of the *New England Journal of Medicine and Surgery*; and the "*Observations on Delirium Tremens*," by Dr. Brown, in the fifth volume of the *Medical Recorder*.

Having had occasion to treat a number of these cases, during a short residence at the New York Almshouse and Penitentiary, as House Surgeon to those institutions, I have thought proper to make it the subject of the following remarks.

The disease naturally divides itself into three stages. 1st, Oppression; 2nd, Excitement; 3rd, Collapse.

First. The stage of oppression is marked by lassitude, indistinct chills, oppression at the præcordia, loss of appetite, nausea, and sometimes vomiting. In this stage the patient is somewhat inclined to sleep; but the drowsiness soon

leaves him, and in a short time the second stage commences.

Second. In the stage of excitement the tongue is furred, but moist; the bowels usually costive; the pulse full, and generally more frequent than natural; the skin, in most cases, hot, but moist; the eyes are turgid, wild in expression, and quick in their motions; the hands and knees become affected with a peculiar trembling; the urine is high-colored, and small in quantity. The patient talks incoherently, occasionally starting as if from some frightful object; shows no disposition to lie down, and is utterly unable to compose himself to rest. He imagines that he is unrelentingly persecuted by some enemy, for a crime of which he is innocent; that every cup presented to him contains poison; that he sees the devil springing upon him, or some ugly animal running over his bed or about the room; that his business is deranged: that he is swindled by his debtors; with many other equally absurd and unlikely incidents. I had one patient who imagined a host of fiends were burning her to death with gas lights. These patients are very impatient of contradiction, extremely obstinate in the belief of their hallucinations, and can be managed only by the mildest, most soothing and persuasive treatment. These symptoms undergo an exacerbation in evening and a remission towards morning.

If, now, the disease be suffered to continue, the *third* stage, or the stage of collapse, comes on. The pulse becomes more rapid and small; the pupils are contracted; the tremor is increased; the tongue and jaws have a trembling motion; the greatest anxiety is depicted in the countenance; the skin becomes cold, and is covered with a peculiar cold and clammy sweat; convulsions, coma, and subsultus tendinum ensue, and death soon closes the scene.

In the fatal cases which I have witnessed, the unfortunate result has uniformly been preceded by a suppression of urine, for twelve to thirty-six hours.

The following cases, with their treatment, may serve to illustrate our observations.

CASE 1. R—— M——, aged fifty-two, was committed to the Penitentiary as a vagrant, June 3d, 1826. When I saw him he was laboring under an epileptic fit, foaming at the mouth, turgid face, and breathing hard. He was immediately bled from the temporal artery about twenty ounces; he then began to tremble, and the nature of the disease was at once manifested. Being impressed with the idea that opium was

a specific in this disease, and in all its stages, I immediately entered upon its use in this case. 3j. tr. opii. were administered at once, and 3j. every half hour prescribed, until he should fall asleep. Upon visiting him at 9 P. M., found to my surprise that he exhibited no signs of sleep, although 3j. tr. opii. had been given him. He was sitting upon his nates, with his legs drawn up, and his head resting upon his knees. He was then ordered gr. ij. opii. every half hour. In the morning of the next day, I found that he had slept none since his admission. The use of the tr. opii. was then resumed. In the evening, found him more sensible, but still remarkably stupid and obstinate, occasionally raising his head, and looking anxiously at his pillow. Having been sadly disappointed in the anticipated effects of my specific, I now determined to try the cold affusion, so highly recommended by Armstrong. He was accordingly stripped, and two pailsful of water were poured moderately over his head and trunk; the laudanum was then continued. At 9 P. M., found that he still slept only at short intervals; had not made water since his admission. The catheter was introduced without difficulty, and only eight ounces of water were drawn off. The cold affusion was then repeated, and the tr. opii. ordered to be continued.

June 5th, A. M. Found him more rational; would talk a little, and said he should soon be better; had passed no more urine, and had slept but little during the night: has had no stool since he came in. Ordered the common house clysters to be repeated till they should operate. The third produced slight evacuations. The man died on the fourth day from his admission. At the commencement, his pulse was full, but became more rapid and smaller immediately after the bleeding, and a profuse sweat made its appearance over his body. The cold affusion was the only remedy that appeared to moderate his delirium or to cool his skin; but these effects were merely transitory.

CASE II. June 8th, W—, committed last evening as a vagrant. Found him this morning laboring under delirium tremens, with a dry skin, flushed countenance, full and soft pulse. Ascribing the unfortunate result of the preceding case to my own inexperience and injudicious management, in not having properly prepared the patient for the use of the opium, I requested Dr. Brown, consulting surgeon of the establishment, to visit this man with me. By his advice I

bled him about ten ounces, which brought out the sweat and increased the rapidity of his pulse. He was then put upon the use of tart. ant. et potass. gr. one quarter, in solution every two hours. At 3, P. M., I found the man's pulse the same as before bleeding. He had raised a considerable quantity of bile without much nausea. Continued the antimonial solution.

June 9th. Pulse rather more frequent, but softer. Antimony operating on the bowels. Patient had slept well during the night.

June 11th. Discharged from the Hospital, cured.

This, though by no means so severe a case as the preceding one, was still replete with satisfaction and instruction to me. Had I given him opium at his admission, he had, no doubt, shared the same fate.

CASE III. L——, committed as a vagrant, on Saturday, June 10th. Found him laboring under delirium tremens, but not very severe. Pulse not much increased in frequency, but rather fuller than natural. He was ordered one quarter gr. tart. ant. every two hours. *Sunday*. Medicine had operated once by vomiting, and several times by bilious dejections. *Monday*. Reduced the dose of antimony to one-sixth gr. every two hours. *Tuesday*. Found he had slept well last night; bowels costive. Ordered calomel gr. xx., rhei gr. xv., ant. tart. gr. j. *Wednesday*. Medicine had operated well. Patient slept well last night; and was discharged cured.

Case IV. H——, committed as a vagrant on Tuesday, 13th June. Came in with delirium tremens; pulse 80 in a minute, and rather full; trembling of the hands; no appetite; foul tongue. Ordered sulph. sodæ ʒij., ant. tart. gr. ij, one-half to be taken immediately, and the remainder three hours after. *Wednesday*. Medicine had operated well; the first dose as an emetic, and the second as a cathartic. Tongue still foul. Towards evening his tremor and delirium had increased, his pulse had become more rapid, and the peculiar sweat appeared on his forehead. The temperature of his skin was natural. Had slept none since his confinement. I gave him ʒiij. tr. opii at 6, P. M., ʒij. with a pint of warm beer at 9, and ordered ʒij. to be given at 12, in case he should not previously fall asleep. *Thursday*. Found he had slept none last night; pulse more rapid; skin hotter: delirium increased: had not passed urine since yesterday at 11,

A. M. At 3, P. M., 20 grs. calomel with $1\frac{1}{2}$ gr. ant. tart. were administered. At 9, P. M., medicine had not operated. Ordered ʒiss. ol. ricini to be taken immediately, and ʒij tr. opii at 12 o'clock, with directions that ʒj. should be given every two hours after, until he should fall asleep. *Friday*. Found the nurse had mistaken my directions, and had given ʒj. tr. opii every hour. The man was decidedly worse; had slept none; bowels had not been moved; had made no water since last report; eyes turgid; tongue much furred. The man died at 12, noon.

Dissection. The dura mater was found in a congested state; the tunica arachnoidea much thickened, opaque, and watery effusion between it and the pia mater. The veins of the pia mater and brain were highly congested; the lateral ventricles greatly distended with water. The stomach was natural, much contracted, and empty; the liver hard, and of an ash color; the gall-bladder filled with bile of the consistence of tar; the omentum smaller than usual, and adherent to the small intestines. The bladder contained but half a pint of urine: the kidneys were natural.

CASE V. B—, aged thirty-six, committed as a vagrant, August 1st, 1826. Found him laboring under symptoms of approaching delirium tremens, with a full pulse, foul tongue, and contracted pupil. I immediately prescribed for him tart. ant. gr. x. dissolved in water ʒiv., one tablespoonful every ten minutes. The medicine vomited and purged him freely. In the evening he was ordered camphor and opii aa. gr. ij., ant. tart. gr. one-sixth, in the form of pill, every two hours. *Wednesday, 2nd*, A. M. B. had vomited the pills, and could retain nothing on his stomach. His pulse was smaller and more frequent, and his pupils much contracted. Towards evening he retained two of the pills upon his stomach. I then gave him gtt. xl. of the black drop, with orders to have it repeated every two hours, with a small quantity of brandy and water, until he should sleep. *Thursday*, A. M. Found he had taken 160 drops of the medicine, with no effect. Towards evening, he became so furious that it was necessary to confine him alone in a cell. I now gave him ninety drops of the black drop at once, and in two hours after, 40 drops more, with directions to have the latter quantity repeated every two hours. *Friday*, A. M. Found he had taken but 60 drops since I left him, and none since two this morning; had slept none during the night. I gave him 90 drops at 7,

A. M. and 40 at 9. He laid down in a few moments, appeared to be comatose, pulse small, a cold clammy sweat over his body, and apparently hastening to the grave. In the course of four hours he rose up as furious as ever, and refused to take any more medicine. He, however, now asked for some beer, of which I took advantage, and gave him one pint, containing 60 drops of black drop. He swallowed it, laid down, and slept soundly from 6 P. M. until midnight. He then began to hollow again, but soon became more calm and sensible. I had directed his keeper to give him forty drops more of the black drop in case he should wake before 10 P. M. He thought, upon visiting him in the morning, that if he could have required it then, it would do as well now, and administered the dose. The patient then fell asleep again, and continued so till 10, A. M. When he awoke, he was perfectly sensible, but complained very much of thirst. Some beer was given him; the first draught of which was immediately rejected, the second he retained, and declared quite refreshing. During the afternoon he was allowed whisky and water to drink. Towards midnight he again began to cry "murder!" and "water!" and in the morning was quite exhausted, complaining of a most intolerable thirst. He had eaten nothing for the last sixty hours. Toast and tea were given him for breakfast, which he appeared to relish very well. From this time he recovered rapidly, and required no more medicine.

This was the most interesting case I ever witnessed. The quantity of opium taken is surprising; but the result justifies the treatment. In the management of this case I was much indebted to Isaac Wood, M. D., (consulting physician of the institution at that time,) for his advice and support.

Treatment. The diversity of opinion existing among authors, with regard to the condition of the system in this complaint, has necessarily led to the proposal of very different methods for its relief. A high degree of nervous irritation, and a disturbed state of the equilibrium of the circulation, seem to exist throughout the disease: still the habits, age, temperament, &c., of the patient so modify its appearances, that no one course of treatment can be laid down to suit every case. In some cases, the symptoms of oppression are immediately succeeded by those of collapse, without any intermediate signs of excitement. In others, the excitement rises to such a degree, that the disease might be confounded

with phrenitis. And indeed this is often the case with young subjects; but should the means proper for phrenitis be employed, the subsequent prostration would soon convince the practitioner of his error. It is therefore necessary, that in every case a correct history of the disease should be obtained before the physician can with confidence enter on any course of treatment. To a neglect of this precaution, either from inattention, or from the difficulty of obtaining the necessary information, may perhaps be attributed the failure of remedies which, under other circumstances, might have proved successful.

The means of cure suggested by authors, are principally the following:—Blood-letting—purgatives—emetics—cold and tepid affusions, and diffusible stimulants. We propose to examine the merits of each somewhat in detail.

Blood-letting is much insisted on by Professor Potter, of Baltimore, in this disease: and indeed the principal fault he finds with Dr. Armstrong's method of treatment, is his want of confidence in this remedy. He remarks, that he has frequently drawn even an hundred ounces of blood from the arm in three or four days; and also, that "the menacing character of the symptoms in the first stage, either in the forms of long-continued convulsions, sometimes indicating approaching apoplexy, or the presence of a ferocious delirium, have compelled us to draw 20 or 30 ounces of blood, without removing the ligature from the arm." Still he admits, that "so sanguinary a procedure" is seldom necessary, and not often admissible, though he has never had cause to regret it. I never bled a patient without regretting it. True, I seldom met with any but habitual drunkards, which undoubtedly makes an essential difference: but the rapid increase in the frequency of the pulse—the immediate appearance of the clammy sweat—the aggravated trembling and great prostration of strength consequent to the subtraction of a very small quantity of blood, in those cases in which I have tried the remedy—have induced me to determine on never employing it again, except in a first attack of the disease, or in a young and very plethoric subject. The weight of evidence is decidedly against the practice. Dr. Sutton observes, that he has "witnessed the cases of this disease to be always most rapidly fatal in robust and plethoric persons, even where bloodletting was much used without the aid of

opium.* And in another place, as quoted by Dr. Channing: "The tremors are rather a symptom of a peculiar disease, which has hitherto been considered to be phrenitis, and when treated as such, has proved to be fatal." "When blood-letting has been employed, and principally relied on, I have observed a fatal termination of the disease in almost every case, though the indication as to habit for its use appeared strong and decisive." Again: "On the contrary, when in such habits," (robust and plethoric,) "the delirium tremens has been endeavored to be overcome by opium, the result has been the most favorable, because the constitution is less broken down." "In a very early stage of the paroxysm, however, if in a very plethoric subject, blood may be drawn; but I do not recommend the practitioner to wait to see the effects of it, with a view of repeating the operation, as thereby the life of the patient may be endangered." Dr. Channing bled his first patient while the perspiration was profuse; he was also vesicated, purged, and had anodynes at night. He became comatose on the third day, was attacked with convulsions, and died. Four other cases of his were attacked with pulmonary inflammation, and treated in the usual way. They were attacked with delirium tremens after the other symptoms were moderated, and two of them died: the other two were cured by calomel and opium. Dr. Armstrong says he invariably saw blood-letting prejudicial, even at the onset, in debilitated and habitual drunkards: but "in constitutions that have not been shaken by reiterated drunkenness," he remarks, "I have known early and moderate venesection of much use, especially when followed by active aperients." Dr. Brown observes: "Our experience constrains us to coincide in opinion with Dr. Armstrong, in regard to the use of the lancet in this disease." Again he remarks: "Even in cases where convulsions come on early, emetics will generally have a more decided and happy effect than the abstraction of large quantities of blood." The fulness of the pulse in the early stages of the disease, is most probably owing to irritation, and not to inflammatory action. It is entirely devoid of strength, and is easily compressed. All authors agree that bleeding is inadmissible, in the latter stages, in organic derangements, and when the system has been worn out by repeated attacks.

* Medical Magazine.

Purgatives. The use of purgatives promises more benefit than that of the lancet; but still they are in no severe case to be exclusively relied upon. "I am fully persuaded," says Armstrong, "that the reare not many instances where the use of the lancet is really requisite; and also, that there are few where purgatives should be omitted in the commencement." I have observed that in most cases the bowels are disposed to be torpid, and have always found early purging highly beneficial. In fact, numerous instances have occurred in the Bellevue establishments, in which nothing else was done but to give the patient a purge, and shut him up in a dark room. These were of course mild cases; but still they showed the good effects of cathartics. It is also a fact, that when the bowels are constipated, opium will not have so good an effect as when they are in a soluble state, and it is extremely unpleasant to be obliged to stop the exhibition of opium at a late period, for the purpose of interposing purgatives. The most proper time for their employment, particularly in habitual drunkards, is evidently in the commencement of the disease, before the stage of collapse shall have supervened: after this period, active purging would be prejudicial. Dr. Armstrong very justly remarks, that after four or five days, laxative enemata will be found most proper.

Emetics next claim our attention. Dr. Klapp, of Philadelphia, who has written on this disease, and published some cases, from peculiar notions of its pathology, depends chiefly on emetics. He indæd seems to regard them as almost specifics; but his recommendation must be received with some qualification. They are certainly in some cases, and in some stages of the disease, a highly valuable remedy; but in other cases, and under other circumstances, they are as certainly prejudicial. Hepatic obstructions and congestions are of frequent occurrence in those who indulge freely in the use of ardent and stimulating liquors; these are undoubtedly best removed by emetics. But in their exhibition, reference must be had to the habits of the patient, whether an habitual or an occasional drunkard, and particularly to the stage of the disease. In the early stages, when there is much nausea, a foul tongue, a bad taste in the mouth, with loathing of food, and oppression at the præcordia, an emetic will be found highly serviceable, and sometimes indispensable. I have seen instances in which the patient has recovered, without its having become necessary to use any other means. This effect,

however, I do not attribute merely to their action in relieving the stomach of crapulous matter; that, undoubtedly, has its share in keeping up the disease, and by its ejection one source of irritation is got rid of. The efficacy of the tartrate of antimony and potash, (which is the emetic recommended by Dr. Klapp,) is more probably owing to its well ascertained effects in allaying nervous irritation, and equalizing the circulation, thus inducing sleep, which, once obtained, generally places the patient beyond danger. The best emetic, therefore, which can be employed, is the tartarized antimony. Where there is much excitement, the following will be found an excellent prescription:

R. Tartarized Antimony, gr. ij.
Distilled water, - - ʒiv.

Dissolve, and give one table-spoonful every two hours. The first dose will generally vomit, and the remainder purge the patient. When, however, it is desirable to procure full vomiting, the medicine must be given more frequently, and in larger quantities. But the use of this remedy is not to be confined merely to its emetic properties. That excitement for which the lancet has been so freely recommended, will, in most instances, be found to be more easily and permanently reduced, and with less hazard to the patient, by the vicarious employment of antimony. Given in small doses, it equalizes the circulation, reduces morbid excitement, allays nervous irritation, and, if it do not of itself induce sleep, it prepares the system in the best manner for the use of opium.

Affusions. With regard to the use of the cold affusion, I can say very little; and of the tepid, nothing from my own experience: but having the sanction and recommendation of Armstrong, there can be no doubt of their importance in this disease. I made use of the cold affusion in three cases, and apparently with good effect; but I did not persevere sufficiently in its application to judge of its merits.

Diffusible Stimulants; and, first, of Opium. This we consider to be the most important remedy in the treatment of delirium tremens. After every other means have failed, this is the great sheet anchor of our hopes. Seldom, when it has been judiciously employed, have we been disappointed in the result; never have we had cause to regret its exhibition. True, it may be, and has been, exhibited in cases where it was directly contra-indicated: but the unfortunate result of these, can surely furnish no conclusive evidence against the

utility of this valuable medicine. Led away by the most absurd and extravagant notions of its specific efficacy in every case, and in all conditions of the system, in the first cases which fell under my care, I employed it under circumstances and to an extent wholly unwarrantable. But the unfortunate result of my practice soon taught me the truth of the maxim—

“Est modus in rebus; sunt certi denique fines,
Quos ultra, citraque, nequit consistere rectum.”

Opium is, in its primary operation, a highly diffusible stimulant, and to justify its employment, there must be a degree of prostration; but if given when there is much excitement, it only increases that excitement, together with the congestions, to which there is always a strong disposition in this disease. Hence probably have arisen the prejudices entertained against its employment, by so many respectable physicians. To suppose that opium will answer every indication, in all stages of the disease, is not only visionary, but idle and hazardous in the extreme. It is necessary that the system should be properly prepared for its exhibition before it is commenced with. In the early stages of the disease, there is usually a considerable degree of excitement, with heat of skin, and great restlessness. This is the proper time for the use of antimony and purgatives; and opium given at this period, would be productive of more injury than benefit. But after the stage of excitement shall have passed over, when the pulse has become small and frequent, the skin cool, the surface of the body covered with the cold sweat, the limbs violently agitated, and no sleep has been procured for some time,—then is the time for giving opium. If any benefit is to be expected from it, it must now be given faithfully and liberally. Dr. Armstrong observes, that “under the most unpromising circumstances, a combination of calomel and opium will *sometimes* succeed; and whenever there is ground for doubting the propriety of evacuations, it should be administered in preference to any other expedient.” As to the manner of exhibiting this combination, he remarks: “Two or three grains of calomel, with a grain and a-half of opium, every six or eight hours, will be sufficient doses of these medicines on the first day of their administration; and after that period, it will be better commonly to lessen the quantity of opium, and as soon as the action of the calomel is at all developed on the gums, or salivary glands, it should

be entirely omitted, as its effects for the most part continue to increase for a few days afterward." This, I am compelled to say, from what I have seen of the disease, appears to me to be but temporising treatment. The learned author gave the calomel to equalize the circulation, probably, as Dr. Brown has remarked, from his preconceived notions of the existence of venous congestions as the proximate cause of the disease. These congestions, as is evident from the nature of the symptoms, do not exist, other than as a consequence of the disease thus constituting the pathological condition of the last stage. The object, therefore, in the treatment of the disease, is to prevent this state of things, and not to cure it before it exists. We have before remarked, that the state of the pulse in this disease, is most probably owing to irritation. If this position be true, the most rational means of cure will be those whose operation it is to allay this irritation in the most direct and speedy manner. It is in this manner, in my opinion, that opium and antimony cure the disease—the supervention of sleep being merely an evidence that the desired effect has been produced.

Professor Potter, in his note on Dr. Armstrong's paper, has given some valuable observations and facts on the use of opium in large doses ; and has also pointed out the condition of system in which it is proper it should be given. "The use of opium alone," says he, "in certain cases of this disease, is clearly indicated, when it has been protracted till the pulses become weak and very frequent, tremors very great, and the state of the understanding indicates a loss of energy in every part of its empire. In such cases, large doses have produced effects so extraordinary, that some have been induced to prescribe them to the very great injury of the patients." This accords entirely with my observations ; and I must attribute Dr. Armstrong's coyness, in regard to the exhibition of opium alone, and in large doses, to the fact that "he has seen and heard enough, to be fully convinced that it is a very perilous practice to administer it in too large and repeated doses, since apoplexy, coma, and convulsions, may be thereby produced." I am well persuaded that too many cautions can not be given, nor too close an examination of the symptoms recommended, previous to the exhibition of this drug. But I am equally well persuaded, that when it has been once clearly and satisfactorily ascertained that opium is indicated, large doses will be found of most benefit. By large

doses, I do not wish to be understood as recommending opium to be given by the scruple, or laudanum by the ounce, and to all patients alike. The term "dose" is relative, and must be considered relatively, to the condition of each patient. Thus the habitual drunkard, and one who has long been accustomed to the use of inordinate quantities of liquor, will both bear and require larger doses than the comparatively youthful debauchee. And again; larger doses will be required, in proportion as the case has verged nearer a fatal termination before advice has been sent for.

By referring to my last case, it will be seen that preparations of opium, amounting to at least five ounces of laudanum, were given in the course of five days, with success. My preceptor, Dr. Brown, (to whom I am indebted for the first correct notions I ever entertained on this subject,) has recorded a case, in the third volume of the New-York Medical and Physical Journal, in which 40 grains of opium were given in four hours, successfully. In Dr. Channing's last case, 20 grains of opium were administered in twenty-four hours; 12 of which were given in the two hours immediately preceding sleep, and with a successful result.

In addition to the above, I may here briefly detail two interesting cases which came under my own observation. The first was a man nearly fifty years of age, of a sanguine temperament, and an habitual drunkard. He came into the Penitentiary in a confirmed state of delirium tremens, and in the last stage. His pulse was extremely rapid—his surface was covered with a cold sweat—his eyes suffused, and remarkably wild—pupils contracted—tremor of the hands amounting almost to subsultus: and was, upon the whole, one of the worst cases I ever saw. One hundred and fifty drops of the black drop were immediately administered in a half pint of brandy and water, made of equal parts of each. I then directed 40 drops more, in a like quantity of brandy and water, to be given in two hours, if the first dose should not have produced sleep previous to that time. The first dose, however, did produce sleep; but to save himself the trouble of watching the man, the nurse woke him up, and gave him the second dose. The man slept sixteen hours, and awoke perfectly sensible.

The other case was a boy of sixteen, admitted at the same time, and in nearly the same condition. Ninety drops of the black drop were given him in brandy and water, which had

the effect of producing a sound sleep for 12 hours. The next day some cathartic medicine was administered, and he rapidly recovered.

The practice of giving opium in this disease, is as old as the description of the disease itself; but the credit of having brought it to its present perfection, is unquestionably due to Dr. Brown, whose writings on this subject we have so often referred to. The great leading object, he remarks, in the treatment of this disease, is to procure sleep. This effect is most certainly obtained by the exhibition of opium. It must, however, be given with an unsparing and judicious hand.

In some cases, it is no easy matter to persuade the patient to take his medicine. In these, I have often succeeded by smuggling the laudanum or black drop into a glass of brandy and water, and then inviting the patient to take a glass of grog. By this means the idea of medicine is not presented to the mind, and the dose is swallowed without difficulty.

The other diffusible stimulants, which will occasionally be found useful in this disease, are beer, porter, gin, and brandy. If they can be given warm, or in the form of toddy, they will produce a better effect than when given cold. I once succeeded, in a very desperate case, in procuring sleep, by persuading the patient to take about a pint of warm gin and porter. These liquors also afford an excellent vehicle for the administration of the preparations of opium. With respect to the further exhibition of these stimulants, during convalescence, it appears to me entirely unnecessary, and may have some effect in leading to a re-indulgence in their use. If the debility be very great, a mild course of tonics, with an occasional laxative, will be found far more advantageous.

Theory of the Disease. Health consists in the harmonious performance of all the functions. Some of these functions are essential to life, and hence have been called vital. Of these, the most prominent are the nervous, the vascular, and the respiratory. These functions are severally capable of acting and re-acting upon each other. The natural stimulus of the heart and arteries is the nervous energy; the natural stimulus of the brain is the arterial blood; and neither of these could exist without the function of respiration. When all these functions are strictly balanced, the other functions of the human body are generally performed as they should be, and health is the result of this harmony. But when, by the action of morbid influences, the vital functions are de-

ranged, the animal functions soon follow, and disease and its phenomena are presented. This derangement may consist either in prostration or excitement, thus varying the character of the disease. Nervous energy may be increased, either directly, by the action of stimuli on the stomach, or indirectly, by their action taking place through the medium of the vascular system. By the gradual application of direct stimuli, the nervous energy may be so gradually increased, as to produce no very sensible effect upon the vascular system; and it may at length become even necessary, to the production of a sufficiency of this principle to enable the heart and arteries to perform their functions. This is well illustrated in the case of the dram drinker. So long as he continues his potations, so long he feels right; but the moment he stops feeding the fire, which, although consuming him, has now become, in a measure, necessary to his existence, a diminution of nervous energy and prostration is the result. Still the spark of life is not quite exhausted, as is shown by a reaction occurring shortly after, with excitement. It is this state which Mr. Travers has denominated *prostration with excitement*. He remarks: "Reaction may be gradual, and restorative of a natural and tranquil state of the system, as exemplified in an ordinary fainting fit; or it may be irregular and violent; in fact, an action unsupported by sufficient power to maintain and carry it through; and in this case, the state of exhaustion into which the patient lapses, quickly terminates life." This is strikingly analogous to the disease we are considering. Some patients get well without any treatment, or with very little, and are examples of the first kind: others require the removal of every source of irritation, together with narcotics, which allay existing irritation, thus moderating excitement, and are examples of the second kind of reaction. It is also remarkable, that the treatment proposed by Mr. Travers for his cases, (arising from surgical causes,) is the very one we have always found most beneficial in this disease; thus adding to the probability of our conclusion; that the condition of the system in both cases, is *cæteris paribus*, precisely similar.

If this view of the subject be correct, the disease may be properly called "The Irritative Fever of Drunkenness."

Without wasting time in commenting upon the different points embraced in this dissertation (of course crude and

imperfect) I can not forbear claiming to have been the first to characterize the disease as one of irritation principally; a view now generally conceded to be correct. I was also the first to show the value of antimony in the treatment. My second and third cases were treated with this agent, to the exclusion of opium—a practice at that time new. If the fourth case had been similarly treated, it is very probable the result would have been different. The fifth case, though successfully treated with opium, I believe now would have been more readily controlled by antimony; and I am by no means sure that the antimony given in the first instance may not have prevented a fatal issue from the opium used subsequently, in an inappropriate condition of the system. In speaking generally of the emetic treatment of Klapp, I distinctly pointed out the *modus operandi* of the Tartrate of antimony, in this disease—a practice since adopted by Law and Graves, of Dublin, and which has been finally established as one of great value.

In the preceding pages, however, I have treated of *Delirium Tremens* only, as due to the sudden abstraction or privation of accustomed stimulus. Such were the cases I had at that time seen—vagrants found drunk in the streets, and committed as such to the Penitentiary by the Police Magistrate. I did not then know that a man might persist in drinking until *Delirium Tremens* should supervene. Since then I have had abundant opportunity to verify this fact.

The opium practice too, has frequently disappointed me, as it has others: By many able writers it has been either discarded altogether, or considered as inferior to other plans. Still I think the weight of authority is to this day in its favor. Now it is impossible for this discrepancy of opinion to exist, unless the several observers have seen the disease principally under difficult circumstances. A difference of pathological condition *only*, can account for the difference of result from the same therapeutics in different hands. Such difference suggested itself to my mind, many years since, as the prob-

able solution of the uncertain effects of opium in my hands, in cases, where I supposed the patient to be prepared for, or to require it. Two distinct conditions, appear to me to obtain in this disease—the one combined with irritation of the cerebral meninges—*probably* inflammatory or approaching thereto—a condition in which sleep is impossible; the other, without the meningeal complication—irritation from nervous exhaustion, similar to that resulting from fatigue, and the like—a condition with which sleep is incompatible. I distinguish these conditions as the *Antimony*, and the *Opium Types*. Either may be much aggravated, by a mistake in diagnosis, and consequently a valuable plan of treatment incur unmerited obloquy from a fault in its application.

After I had recognized this difference in pathological condition and had seen that the disease might supervene upon a protracted debauch as well as upon a sudden withdrawal of stimulus, the question arose as to whether the difference in apparent cause would furnish a clue to the diagnosis, and of itself would occasion the difference of condition. I think not. I mean in the habitually intemperate. I am persuaded both pathological conditions are met with from both causes. However, others think differently. Thus, Copland divides the disease into “1st, Delirium with Tremor and Excited vascular action in the membranes of the Brain; 2d, Delirium with Tremor from exhausted Nervous Power.” The first species he says “forms the connecting link between that which is purely nervous and that depending upon inflammatory action of the membranes and peripheries of the encephalon. That it may run into, or form a slight grade, or modification of inflammation of these parts, in some cases, I will not dispute; but that it is always inflammatory, is opposed by the fact that it will often subside spontaneously, in a short time after its cause has ceased to act. The *Delirium Ebriosum* of Darwain and some other writers, or the delirious affection which is *immediately consequent* upon intoxication, is an example of this; it sometimes subsiding in a few hours, or in a day or

two, when not injudiciously interfered with; but this is only an occasional occurrence and cannot be trusted to. This state of delirium, when directly produced, as it commonly is, by intoxication, is not always accompanied by tremors at its commencement, but when thus accompanied, it is often mistaken for the true form of delirium tremens, into which it however not unfrequently passes, chiefly owing to the cause in which it originated. It is generally attended by extreme irritability, often by great violence and sometimes by general spasms and constant vomiting. The head is usually hot and the face flushed." Of the second species he says, "Whilst the former state of delirium is often *directly* occasioned by drunkenness, this is as frequently *indirectly* produced by the same cause; the one being immediately consequent upon or accompanying intoxication, the other commonly resulting from the *abstraction* of the *accustomed stimulus*, after an habituated or continued indulgence in it, or after a protracted fit of inebriety." Copland has also identified this form with the "Delirium Traumaticum" of British writers. Here, then, we have the Sthenic and Asthenic forms of modern writers, my *Antimony* and *Opium Types*, considered as the pathological sequences of the two modes of causation—the former as due to protracted drunkenness, the latter as the effect of the sudden abstraction of accustomed stimulus.

Dr. Corrigan has described three varieties of the disease—Asthenic, Sthenic, and a mixed form. The *Asthenic*, he attributes to a persistent use of stimulants, till the man can neither drink nor eat any more. "He cannot sleep; images of various kinds float before his eyes; his stomach is sick; pulse quick and weak; skin cold and clammy—a set of symptoms constituting as I have said, a state of collapse consequent upon the cessation of long continued stimulants. Your patient is altogether in a condition in which death may occur at any moment, so that the prognosis is here extremely uncertain." I may remark here, that these attacks frequently repeated induce a state from which there is no hope of recov-

ery. The assimilative power is arrested—paralyzed; the mucous coat of the stomach is disorganized, and sometimes presents the appearance shown in Sewell's plates. These patients never rave violently; they never make the frantic and determined efforts to rise from bed and overpower their attendants, that the less fatally affected so generally do. They perish from the combined effects of irritation and inanition, and all modes of medication, are equally unavailing.

The Sthenic form, according to Dr. Corrigan, occurs in the man who has been drinking two, three, or four days, and then suddenly leaves off. "This man is in a state of irritation of the brain and nervous system only in a trifling degree removed from actual phrenitis." * * * *

Corrigan and Copland both recognize the two forms and the two causes, but seem to attribute diametrically opposite effects to the respective influences of the different causes.

The third variety of Corrigan I must quote entire:—"A man presents himself who has been at one time temperate, at another, drinking, perhaps, for two or three days, and is now laboring under more or less irritation of the brain, manifested by slight attacks of delirium and want of sleep, forming, in fact, a link between the condition already described as asthenic delirium tremens and the state of collapse. The subject of a case like this gets repeated attacks of a trifling kind; he may be, as I have said, at one time temperate, at another—perhaps in travelling and stopping at different hotels—drinking three, four, or a half a dozen days, and at length falls into a state constituting our third division; he is capable of exertion, understands what you say to him, and will speak collectedly, but when left to himself, fancies strange sights hovering about him. He is neither, as I have said, in the state of collapse of the asthenic form, nor does he betray the symptoms of cerebral derangement observed in the asthenic variety of the disease, but there is danger of the affection assuming the perfect form from the too frequent recurrence of these slight attacks of mental aberration." This is an

important variety, and sometimes a very puzzling one to treat. We shall recur to it presently.

Dr. James Bird, of London, has some excellent practical remarks on *Delirium Tremens*, in the *London Journal* of 1850. The usual divisions, he says, are into two species—the one succeeding the excitement of hard drinking without any intermediate abstinence from the accustomed stimulus—the other attacking habitual drunkards soon after the accustomed stimulus had been withdrawn. The former may be considered as a state of *Hyperæsthesia* and increased vascular action in the nervous centres or in the remote organs acting on them; the other, a state of *Hypæsthesia* or exhausted nervous sensibility or diminished vascular action of the capillaries more nearly akin to congestion than inflammation. Contrast this with the observations of Dr. Corrigan. Both Corrigan and Bird recognize the difference of type and see the disease supervening upon a continued debauch in the one case, and upon an interrupted debauch in the other, but attribute the *Sthenic* or *Hyperæsthetic* form in the one instance to one cause, and in the other instance to its opposite, and so of the *Asthenic* or *Hypæsthetic*.

So marked a difference in the chain of causation and in the type of the two forms of the disease would naturally suggest a relation between them. But if these differences were related as cause and effect, it is impossible that such observers, with such opportunities, as Copland, Corrigan, and Bird, should differ, as to the form of the disease due to the one or the other. But, as I have already said, I am persuaded both forms of the disease follow both causes; and I now add that a diagnosis as to the *Sthenic* or *Asthenic* character of a particular case, based upon the fact that the attack supervened upon a persistent debauch or upon a sudden interruption to a drunken fit, will be frequently erroneous.

Is there then any sign by which the opposite types of this disease may be distinguished? I think there is, and that the condition of the pupil affords this sign—a *contracted* pupi

being characteristic of the *Sthenic* or *Antimony Type*, and a *dilated* pupil of the *Asthenic* or *Opium Type*. I believe that Opium is inadmissible with a contracted pupil, and that it is an heroic remedy with a dilated pupil. The careful, accurate, discriminating, and experienced physician will be able to judge from a number of other signs in many instances, to which type a particular case belongs; but all of us are not equally gifted with this valuable talent; those who are not, I feel sure will not be deceived by the simple test I have here suggested. I believe, moreover, that errors of judgment are sometimes committed, in this respect, even by the most competent gentlemen in the profession, for want of some means of discriminating more definite than any given assemblage of symptoms. Should this paper meet the eye of any such, I hope they will use my test and communicate the result of their observations. Certain I am, that it has not deceived me for a period of fifteen years.

Unless there be still much confusion among medical men as to the nature of the cases of this disease they are in the habit of seeing, how can we account for the difference of opinion existing as to the value of Opium, Antimony, Calomel, the lancet, &c., in the treatment? There seems to be as much diversity in this respect now, notwithstanding the multiplied observations of the last thirty years, as existed at the commencement of that period. Let us glance at the views of some of the most prominent writers.

Dr. Ware is opposed to the opium treatment, because he has found the proportional mortality greater under that treatment than under other methods. He has given us a table of sixty-nine cases; fifteen of these were treated with opium, of whom six died; twelve were treated with emetics, of whom but one died: the Eclectic method furnishes him with nine cases, of whom five were bled and three died.

I have taken this table from Braithwaite's *Retrospect* for 1841. We are not informed, what particular emetic was used in the twelve cases; it is probable it may have been the Tart.

Antimony. Now I do not doubt that the fatal cases in which the Opium was used, were either of that type in which the Antimony ought to have been used or were persons "*burnt out*" by long-continued intemperance; it is moreover possible that the fatal case following the emetic treatment was one in which Opium ought to have been used, for it is probable the emetic plan might have been practiced in one of the exhausted cases.

We next adduce the opinions of Dr. Watson. He thinks Opium the grand remedy, but that it is not to be given indiscriminately nor trusted to alone. In some cases it must be given cautiously if at all—in others, combined with depletion—in others again, with strong drink. He thinks blood-letting in most cases positively injurious. "The great indication is to procure sleep; and the remedy in nine cases out of ten you will find successful, is Opium."

Again, "You may ask me, what is the essential nature of the disease; and I can only state in reply that it consists in *nervous irritation*." I here remark in the first place that the results of the Opium practice must have been widely different in the hands of these two eminent men. Dr. Watson is too cautious and too philosophical a writer to have said Opium would be successful in procuring sleep in nine cases out of ten, if a mortality of six in fifteen had followed its use under his observation. Dr. Ware observed in Boston, Dr. Watson in London. The probabilities are, and the conclusion in my mind is, that they saw totally different types of the disease.

I remark next, that I do not exactly like Dr. Watson's expression, "the great indication is to procure sleep." The great indication is to *subdue the irritation*, the pathological condition of the disease. This done, sleep follows of course, and *generally* shows that the morbid irritation is subdued. I say *generally*—it does not always show this, for in numerous instances, the patients have awaked after hours of sleep as furious as ever, and the treatment has been again required. Inhalation of Chloroform has sometimes put one of these men,

to sleep, but I do not know of any case in which that sleep has been successful. Dr. Watson remarks further, "I know persons who in treating these cases combine Calomel with the Opium. And they say they cure their patients so; and I make no doubt they do; neither can I doubt that the same success would have attended the same quantity of Opium without the Calomel. In pure cases of delirium tremens, I advise you *not* to give Calomel. I know no possible good it can answer; it is itself a source of great irritation to the nervous system in many persons." Contrast this with the remark of Armstrong already quoted, "under the most unpromising circumstances a combination of Calomel and Opium will sometimes succeed; and whenever there is ground for doubting the propriety of evacuation, it should be administered in preference to any other expedient."

Dr. Corfe, of the Middlesex Hospital, who thinks the disease is purely hepatic in its origin, deduces this opinion from the *success* of *Calomel* purgation in the treatment, as well as from the signs of hepatic derangement at its onset. What a wide difference of opinion we have here as to the value of Calomel in delirium tremens.

With regard to Dr. Corfe's deductions from his premises, I must express my dissent. That these hepatic derangements occur from intemperance, and that they frequently complicate delirium tremens, no one will dispute; but that they constitute the pathological condition, or form any essential part of the disease, is another matter. It seems to me to be a sufficient reply to this opinion to say that similar derangements occur from a variety of causes independent of the abuse of alcohol or opium, but they are never developed into delirium tremens.

Dr. Morehead, who has arrived at the conclusion that the disease runs a certain course, that it requires a given time to subside, is strongly in favor of the Antimony treatment in the first stage. He remarks, "But the exhibition of Tartar Emetic, with Opium or other narcotics, first, I believe, intro-

duced into practice by Dr. Law, of Dublin, and followed by Dr. Graves, Dr. Clendening, and others, constitutes the most successful means of controlling the symptoms of this stage of the disease." His reasons for supposing the disease to observe a certain course are:—That a dose of Opium that failed one day in procuring sleep, succeeded the next; and that opiates sometimes procure sleep for three or four hours, when the patient wakes up as crazy as before. Dr. C. J. B. Williams, while condemning the indiscriminate use of Opium, acknowledges it is all sufficient in a majority of cases. Mr. Phillips, in the Medical Gazette for November, 1846, has some judicious observations on the use of Opium. He thinks that uncomplicated delirium tremens is always amenable to Opium, "but if a patient's face be flushed, if his head be painful, his pulse be hard and full, the light be offensive to his eyes, and the noise to his ears, we shall then suspect that the brain is affected beyond the point where delirium is manifested and means appropriate to that condition must be employed—it will, in all probability, *not* yield to Opium." Mr. Philips, although he has confidence in Opium as the remedy, still finds its use limited, by a brain complication. He has described a very severe one, however, as his limiting case. I think a much less decided meningitis should also preclude the use of Opium. I think, moreover, it would be very difficult to verify the painful impressions of light and noise in one of these cases. A patient with delirium tremens will stump about the ward upon a compound fractured leg, or one recently amputated, without giving any indication of pain—how then expect him to indicate that light or noise distressed him? Yet these two I consider the most important of his group of contra-indications to the use of Opium. When his other signs are present, no one I presume would think of using it.

I have now cited authorities enough to show that although, an essential difference of pathological condition is conceded to exist in cases of delirium tremens, the professional mind is not yet settled as to the methods of discriminating among

them, or the therapeutical value of the various systems of treatment which have been proposed. For the solution of this difficulty I propose to divide the disease into the Antimony and Opium Types—the one characterized by the contracted pupil—the other by the dilated pupil. In the former I suggest as the basis of the therapeusis the employment of the Tart. Antim. et Potas., in doses as large as can be tolerated by the stomach, with a view of subduing the nervous irritation I suppose to constitute the disease. In the latter, I suggest the use of Opium as the basis of the treatment, with the view of giving the excito motor function a sufficient period of repose to recover its nearly exhausted energy. To these opposite agents I would refer the selection of such other juvantia as the particular features of each individual case should seem to require, taking care that such supplementary or modifying agents should coincide with, and not be opposed to their basis, in their respective modes of action. Opium and Antimony I consider as the natural antagonists of the opposite conditions. When other agents have been successfully employed in isolated cases, the favorable issue has been due to their analogies in therapeutical effect to these two.

But there is still another class of cases, in which complications of various kinds exist, which render the diagnosis not unfrequently exceedingly difficult. These complications are so masked by the predominating irritation and act as such potent disturbing causes, as to the symptomatic indications, that we are frequently at a loss in which category to place the case. They constitute what we term “failing cases” of our differential sign. In these cases the pupil is neither decidedly contracted nor decidedly dilated. This is the third variety of Corrigan; but it occurs not only from the causes of Corrigan—it is seen not unfrequently from the causes he and others assign as the generators of the primary types. The pathological combinations in these cases are so numerous, we cannot attempt to enumerate them. They afford scope for the exercise of the greatest degree of therapeutic

skill and ingenuity. Signs of gastric and hepatic derangements, of congestions of the portal system, of paralysis of the nutritive function, of arrest of the function of the kidneys, sometimes of an hysteric nervous perturbation, will present themselves and call for appropriate modifications of treatment. These cases are sometimes protracted for a period of ten or fourteen days, and even more, assuming daily variations of form, vibrating betwixt the Opium and Antimony types, and not admitting of the decided employment of either plan. Fortunately, however, they are not so pressing in their requirements as the primary forms. Time is afforded to feel our way. These are the cases that Watson considers so "puzzling and exceedingly difficult to treat—require opiates on the one hand and moderate depletion on the other. When the indications are uncertain we must cautiously try our remedies."

In the treatment of these cases, it is best to begin by clearing away the rubbish as far as practicable, by emetics or purgatives, according to circumstances, leeches or cups to the head or epigastrium, the cold affusion, &c. By these means the prevailing type will frequently be unmasked and the proper plan of cure revealed. Still, however, it happens that it is not yet absolutely certain to which form the case belongs, and a mixed plan must be resorted to. If in such a case, the tendency were to contraction of the pupil, I should combine the Antimony with Belladonna or Hyosciamus. I have sometimes in this way procured a decidedly dilated pupil in the course of eight or ten hours, and then have given Opium with a view to secure the promised sleep, and have found myself mistaken—increased excitement with contracted pupil, has resulted, and the use of Antimony has been again demanded. Where the dilated pupil is the effect of remedies having a specific action upon that organ, we must exercise great caution in the employment of Opium. The case may differ essentially from that of the dilated pupil of the asthenic form of the disease.

But we are again puzzled in these cases by the persistence of the irritation, and of the delirium even after we have succeeded in procuring sleep for hours, and more than once. Some local complication exists, keeping up the irritation in defiance of the temporary triumph of either the Antimony or the Opium. Here we have found the Calomel and Opium treatment of Armstrong of great value, and notwithstanding the unfavorable opinion of Watson, we cannot help endorsing it.

It will sometimes happen, that although the indications are plain as to which plan of treatment is required, we cannot at once employ it on account of the extreme irritability of the stomach. In these cases we have found the use of Chloroform in small doses (15 or 20 drops,) of decided benefit. We repeat it every fifteen or twenty minutes, gradually increasing the interval, until the vomiting ceases. Dry cups to the epigastrium at the same time, will materially aid the Chloroform.

There is one point in the management of these cases, that I cannot refrain from noticing, as I have reason to believe it is frequently too much neglected, viz:—the necessity of sustaining the strength of the patient by appropriate and judicious nutrition. Though it would not be practicable nor wise to crowd the debilitated stomach with food, still something may be done in the way of nourishment without overtasking that organ or interfering with the action of remedies. Small quantities of concentrated and savory broths can be safely and frequently introduced into the stomach and will prove of essential advantage in the treatment.

“Habitual drunkards are always tippling, but they do not eat; they have no appetite, no power of digesting; the consequence is, that while they are in a state of continual intoxication, they are in a state of perpetual starvation. Inanition is induced, another cause of the exhaustion of the bodily powers generally, and of excitement of the nervous functions in particular. It is well known that in all

cases of inanition, the bodily powers are depressed, but the nervous function is the last to suffer; it remains excited, in fact, in the midst of a general state of depression, as we see in cases of combined starvation, privation of food, and exhaustion from other causes. In excessive loss of blood, or drains of other kinds which exhaust extremely, we find the nervous system remain excited, even in the midst of weakness.”*

Since, then, deficiency of nourishment is so important an element in the causation of delirium tremens, it is a plain dictate of common sense that this evil should not be aggravated when a case is under treatment, either from forgetfulness or from the mistaken motive that food is contra-indicated, while so much apparent excitement exists.

of the body, the body is composed of the
 nervous system, the brain, the spinal cord,
 and the nerves. The brain is the center of
 the nervous system, and the spinal cord
 is the main part of the nervous system.
 The nerves are the branches of the nervous
 system, and they carry the messages from
 the brain to the rest of the body.

The brain is the most important part of
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